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OCT 27 2008

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Appl. no. 10/579,109
Atty. ref. VM001c0nUSb

AMENDMENTS TO THE SPECIFICATION

Kindly amend the specification as set forth in the following manner. The paragraph numbers are those used in the published version of the application, US 2008/0230740 A1.

Please amend paragraphs 0001-0003, including the heading before paragraph 0003. All of these appear on page 1 of the amended international specification received by the USPTO on 24 April 2008 (hereinafter "the 4/24 specification").

The present invention is related to the field of cooling ~~[[an]]~~ internal combustion engines (passenger and truck vehicles), and ~~also cooling of~~ other cooling and heating systems where heat ~~exchanger is~~ exchangers are used. Precisely, this invention is related to field of fluids - liquids for cooling the operating engine, i.e., to the anti-freezing and anti-corrosive agent composition (~~antifreeze is the word originating from English language and as such it is adopted in our language, and literally it means anti ice, anti-freezing~~) and to the composition of antifreeze regeneration agent, primarily glycerin-based, ~~and which are thereat absolutely nontoxic, and which comprise variety of other components, depending on application in particular weather conditions, i.e., conditions of application.~~

~~According to international patent classification (MKP/IPC) inventions belong to class F 01 P 3/00, class B 60 K 11/02, by which the cooling of machines (engines) or other cooling and heating systems are generally defined, i.e., cooling by fluid liquids, which are added to stop the corrosion. Beside the said class, inventions belong to class C 09 K 005/00, by which devices and apparatus in vehicles are defined such as to facilitate cooling of operative units with cooling liquid.~~

TECHNICAL PROBLEM

The technical problem which is solved ~~by inventions~~ is how to obtain an ~~composition~~ anti-freezing agent useful in open and closed cooling systems, to obtain nontoxic liquid (fluid) for heat exchange ~~according to the invention~~, and at the same time to obtain anticorrosive protection in cooling system for all metals, especially for aluminum engines or parts of the engine, i.e., how to obtain ~~agent~~ composition that will be used for regeneration and modification of anti-freezing and anti-corrosive agent.

Please amend paragraphs 0004-0007, which appear at pp. 1-3 of the 4/24 specification:

There are known cooling fluids which are used in the cooling systems of internal combustion engines, in open and closed cooling systems, which do not freeze at temperatures from -30°C to -40°C. Most of these fluids are in marketed under the name antifreeze, ~~and among domestic manufacturers the major are: Kotrman, NIS Naftagas, Petrohemija Pančevo, in Bosnia and Herzegovina Optima~~

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~~Medriča, etc. There are known great world manufacturer among which major are BASF from Germany, Preston from SAD, and many other.~~

Mainly, the compositions are specifically formulated with ethylene glycol or propylene glycol, or with derivates thereof, and include additives which inhibit and reduce corrosion of the cooling system. ~~Very important is to~~ To develop specific cooling agent formulations[[,]] is important because, with appearance of engines with higher performances, especially heavy-duty diesel engines, there are growing numbers of ~~these engines~~ engine components which are produced from a variety of materials to reduce[[,]] weight and enhance efficacy. Therefore, specific additives are selected so to provide special advantages, such as providing protection for one or more selected materials. However, these additives are often selected in such a way that their beneficial properties are mutually supplemented. Despite formulating ~~specificity of these~~ specific cooling agent compositions, advantages that are connected to many additives may be disturbed[[,]] because many drivers pour hard water in the cooling system. Hard water may be added either after initial filling of the cooling system or during the service, since drivers themselves, but also workers in relevant services add ordinary water in the cooling system (i.e., they change water that ~~have~~ has been lost by evaporation and the like).

[0006] However, in many parts of the world there is no available suitable water for use in ~~the cooling systems~~. Hard water contains ~~certain number of~~ minerals, mostly calcium, magnesium and iron salts. These minerals may contribute to loss of efficacy and to reduce lifetime of cooling agent composition. The loss may be especially adverse for heavy-duty diesel engines that may pass ~~away~~ over 20,000 kilometers per month. Non-effective cooling agent composition may reduce engine lifetime, clog internal passages in the cooling system, contribute to cylinder liner corrosion and clog water pump, ~~where all that have as a result an expensive engine repair.~~

[0007] ~~Surely, the tendency of~~ The trend toward reducing noxious ~~gasses~~ emissions ~~has as a resulted in~~ some progress in engine emission technology, and that progress may induce change of usual ethylene glycol and/or propylene glycol bases which have been for almost one century the main carrier for engine antifreeze formulations. New engine components, especially devices for exhaust gas[[ses]] recirculation (EGR), ~~produce~~ result in much bigger thermal stress to the engine cooling agent. Ethylene glycol and propylene glycol oxidation may be drastically accelerated, which results in cooling agent that becomes ~~improper~~ unacceptable for ~~continuous~~ continued usage, even in such short time intervals as several months. Therefore, manufacture is moving toward ~~formation~~ engine cooling agents which operate in longer time intervals, i.e., toward ~~formation~~ agents by which it will be ~~are~~ possible to regenerate and/or optionally to modify ~~wasted cooling agent (antifreeze).~~

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Kindly amend paragraph 0009, which appears at page 3 of the 4/24 specification:

~~There are relatively a great number of patent applications, i.e., approved patents which describe antifreeze, i.e., cooling agent. Generally, according to herein applied invention, difference is in that their basic bases are mostly some other chemicals and that they use less additives, and in different ration, where for most of them it could be said that they don't have anti-corrosive effect and almost all are toxic. Examples of patent literature references relating to antifreeze compositions include~~

Kindly amend paragraphs 0023-0027, which appear at pp. 4-5 of the 4/24 specification:

~~Disadvantages of all mentioned the foregoing, but also as well as many other solutions, is are that they are toxic, their lifetime is limited to ~~the most~~ two years, they have ~~not~~ insufficient inhibitory protection, they weaken alkali stocks, and their pH value is ~~small~~ too low - about ~~6,2-7,2~~ 6.2 to 7.2 (it must be between ~~9,5-11,5~~ 9.5 and 11.5 according to ASTM standard - ~~USA standard~~). The present inventions ~~Inventions applied herein~~ meet ASTM standards.~~

~~Presentation of essence of the invention~~ DESCRIPTION OF THE INVENTION

~~This invention is related to new antifreeze/anti-freezing (and anti-boiling) agent composition with a non-toxic basis in water solution in concentration to 96%, which can be used immediately. This antifreeze may be used concentrated or diluted with distilled water. It is non-toxic.~~

~~Here is also presented the composition of~~ Also described is an anti-corrosive inhibitor in water solution for wasted antifreeze, which ~~beside the composition of antifreeze alone makes invention conception unique, in sense of its using can be used~~ on the one hand for antifreeze production and on the other for regeneration and modification of that antifreeze[[,]] when ~~that~~ antifreeze is wasted.

~~Applicant noted that detailed~~ Detailed descriptions of both inventions are given below, but their specific compositions will be dependent only of application conditions (type of ~~the~~ vehicle, i.e., other agents, climatic conditions, etc. and ~~other~~). In that sense given compositions are not limiting.

First, anti-freeze and anti-corrosive ~~agent~~ composition (antifreeze) will be ~~described represented~~. This composition ~~base makes includes~~ distilled (softened) water, non-toxic base (glycerol), and suitable inhibitors. By mixing these ingredients, anti-freezing and anti-corrosive agent for engines is obtained, which is ecologically correct, biodegradable, non-toxic and not harmful for natural resources, does not pollute soil and water, not toxic for humans, fishes, animals and pets, and ~~thereat it~~ successfully protects engines (protects system against freezing and corrosion, against forming plaque and foam in the system, and ~~raises~~ increases the boiling point above 120°C).

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Kindly amend paragraph 0031, which appears at page 5 of the 4/24 specification:

- ~~quality min. 98.0% (99.5%)~~ minimum purity of 98.0% (99.5%)

Kindly amend paragraph 0034, which appears at page 5 of the 4/24 specification:

- 4. ~~Three-ethanol-amine~~ Triethanolamine ((HOCH₂CH₂)₃N) - an inhibitor against corrosion of iron and steel ~~in watery solution~~

Kindly amend paragraphs 0044-0047, which appear at pp. 5-6 of the 4/24 specification:

- 8. Sodium[[-sul]] sulfite
 - chemical formula ~~(without water NaSO₃) or (NaSO₃)₂H₂O~~ Na₂SO₃ (without water)
or Na₂SO₃ • 7 H₂O
 - in this formulation, it's a good inhibitor for magnesium, aluminum or their alloys in alkali environment or in ~~watery~~ aqueous solution of glycerol
- 9. Potassium[[-sulfide]] sulfate

Kindly amend paragraphs 0049-0050, which appear at page 6 of the 4/24 specification:

- ~~min. minimum purity of 99% quality~~
- ~~solution-easy soluble~~ solubility in water

Kindly amend paragraphs 0052-0056, which appear at page 6 of the 4/24 specification:

- 10. Sodium[[-]].chromate
 - chemical formula in acids ~~HNO₃, H₃PO₄ and H₂SO₄~~ (Na₂CrO₄)
 - corrosion inhibitor of steel, cast iron, aluminum, ~~copper, zinc and messing~~ copper and zinc in ~~watery~~ aqueous solution of this formulation
- 11. Sodium[[-]].benzoate
 - chemical formula ~~C₆H₅SO₆a or (C₇H₅O₂Na[[]])~~

Kindly amend paragraphs 0062-0064, which appear at page 6 of the 4/24 specification:

- 14. ~~Polymark polycarboxilate-BASF~~, Polycarboxylates which are soluble in watery and alcohol solutions. In this invention is marked such as SOKALON® SOKALAN® CP-12S or CP-10 (BASF). In this formulation, ~~well-applicable is ABC COBLEX's polycarboxilate, too~~ polycarboxylates also are useful.
- 15. Sodium[[-]].metaborate
 - chemical formula ~~(calculated on B₂O₃) + 2+3+4~~ NaBO₂ with application in concentrations ~~of from 0,5-5 mass~~ 0.5 to 5 parts by weight

Kindly amend paragraphs 0066-0069, which appear at pp. 6-7 of the 4/24 specification:

Process for obtaining antifreeze ~~is conducted through~~ involves several phases. First, distilled water preparation is performed (softened to I degree), or totally distilled and free from all minerals and contamination. Mixing is performed with polyvalent alcohol (glycerol) at temperatures of 80-90°C, with continuous

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agitating until homogenization is completed. Basic base-crude material ~~ratios,~~
ratios may be different dependent on what is desired to be designed. Main crude
material may be 66:34, 70:30, 80:20, and different ratios are possible. In said ratios
it is necessary to ~~left~~ leave space for inhibitor (modifier, emulsifier) ~~{whose~~
~~composition will be presented below in this application}~~ with its participation in
quantitative content with of 10-20%. After that, heating is continued with the same
temperature and agitating until homogenization (unification) of the product is
completed. ~~Against~~ To inhibit foaming, silicate oil is added in small concentrations
~~of 0.004-0.009%~~ (0.004 to 0.009%). Additionally, high quality and also non-toxic
dye is added, ~~that is i.e., the type~~ used for nutrition or cosmetics. Final product is a
light green or light blue liquid. Dye is added ~~to fluid to indicate is there any liquid in~~
~~the system, and because the~~ thus obtained liquid is white and clear.

In other words, ~~the performing of the production process is~~ involves the
following: the substances-additives in group A ~~is mixing~~ are mixed, then, ~~there is a~~
~~mixing of~~ additives from group B are mixed, and finally, ~~the mixing of~~ additives from
group C are mixed. After that, on the same sequence as above, there is mixing of
groups, one by one, ~~on the at a~~ temperature of 80°C, ~~using a mixer with small~~
~~numbers of revolutions, and at~~ about 100-200 revolutions per minute.

The mixed additives are ~~mixing~~ mixed into the basic substance, according to
tables and sequence, after the preparation of additives. The ~~relations is the~~
following relative proportions are as follows: for ~~minus~~ temperature of -25°C, the
additives from table "A" in Table A are used with 38% of basic substance
(glycerol);[[,]] for temperature of -35°C, the formulation ~~from table "A"/B is mixing~~
"B" from Table A is used with 48% of basic substance;[[,]] for temperature of -55°C,
the formulation ~~from table "A"/C is mixing~~ "C" from Table A is used with the 60% of
basic substance;[[,]] and for the ~~minus~~ temperature ~~over of at least~~ -65°C, ~~there is a~~
~~mixing of the~~ formulation ~~from table "A"/D~~ "D" from Table A is used with the 88% of
basic substance. All these combination can maintain the temperature from 110°C
~~till to~~ 160°C in plus.

Thus obtained antifreeze is non-toxic, biodegradable and it does not pollute
the environment. Additionally, this is very durable (resistant) fluid – it can be used
for more than six years or 350,000 km in the cooling system. It is used useful for
temperatures between from -70°C to +160°C, dependent on concentration[[,]] (max.
96%). ~~There should be noted that at~~ At low temperatures this fluid does not change
to solid, but to frail, delicate crystals that do not ~~make pressure to~~ create pressure
on the walls of the engine, pipes and other parts, ~~but break out those parts,~~ and
during engine ignition those crystals are readily heated and melted without
damaging engine and other cooling system structures.

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Kindly amend paragraph 0071, which appears at page 8 of the 4/24 specification:

As already noted, specific agent composition will be ~~depended~~ depend on application conditions, agent in which it is used, etc. ~~Therefore for example for temperature of 25° C., additives from table "A" with 38% of basic substance (glycerol) are used, for temperature of 35° C. formulation from table "A"/B with 48% of basic substance is prepared, for temperature of 55° C. formulation from table "A"/C with 60% of basic substance is prepared and for temperatures above 65° C. formulation from table "A"/D with 88% of basic substance is prepared. All these combinations are resistant temperatures from +110 to +160° C.~~

Kindly amend paragraph 0073-0077, which appear at page 9 of the 4/24 specification:

Here follows description of composition of anti-corrosion non-toxic inhibitor water solution, i.e., description of regenerator composition for wasted antifreeze. This composition is inhibitor for above said antifreeze and as such it is ingredient of that antifreeze. At the same time, this inhibitor is designed for use as modifier and regenerator for wasted antifreeze, and it extends antifreeze lifetime and refreshes anti-corrosive protection of for a wide variety of internal combustion engines and also other engines, heating and cooling systems. This inhibitor is used in small concentrations (from 8 to 12% by weight) for regeneration and modification of wasted antifreeze ~~from 8% 12% by weight~~ in which it is poured, i.e., antifreeze with 10% - 18% of inhibitor.

~~Therefore, this~~ The invention provides aqueous concentrated anti-corrosive formulation, which is suitable for use as additive for wasted fluid - antifreeze in engine cooling system. This invention enables extension of anti-corrosive protection lifetime for fluid/antifreeze in internal combustion engine cooling system. ~~Referred to inhibitory properties, it~~ It has great ability for anti-corrosive protection. ~~This agent and~~ may be used as emulsifier and modifier.

It is very important that it is non-toxic ~~inhibitor~~. ~~Especially, advancement and effectiveness is represented by adding this~~ This inhibitor can be added in small amounts to the wasted antifreeze, relative to total weight of wasted antifreeze. This inhibitor is very potent. It regenerates wasted antifreeze, it is resistant to high boiling temperature, it lowers freezing point, has great ability for heating and cooling system anti-corrosive protection, brings alkaline stocks to satisfactory level and ~~raises~~ raises pH values. ~~Thereat, it~~ It can be used in any antifreeze, it is made of polycarboxylate, and it is soluble in alcohol, alcohol/water mixture and in water alone. It does not corrode[[,]] nor damage[[s]] cooling systems, and it is efficacious in a small concentration.

~~Namely, conventional fluids-antifreeze~~ Conventional antifreeze solutions weaken due to application use. Their lifetime is very limited. In ~~drained old~~ antifreeze solutions, the pH value lowers decreases and its protection against corrosion becomes minimal or ceases.

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~~Composition of anticorrosive agent-inhibitor water solution with particular additive type make, besides~~ Besides the additives indicated for the antifreeze composition, the following additives can be useful in the regenerator composition:

Kindly amend paragraph 0080, which appears at page 9 of the 4/24 specification:

- ~~quality at least 98,0% (99,5%)~~ minimum purity of 98.0% (99.5%)

Kindly amend paragraph 0083, which appears at page 10 of the 4/24 specification:

- 4. ~~Three ethanol-amine (three ethile-amine~~ Triethanolamine $((\text{HOCH}_2\text{CH}_2)_3\text{N})$ a corrosion inhibitor of iron and steel in ~~water~~ aqueous solutions.

Kindly amend paragraph 0087, which appears at page 10 of the 4/24 specification:

- 6. Sodium[[-three-polyphosphate]] tripolyphosphate

Kindly amend paragraphs 0095-0098, which appear at page 10 of the 4/24 specification:

- 9. Sodium[[-sulfide]] sulfite
 - chemical formula ~~(without water~~ Na_2SO_3 (without water) or $\text{Na}_2\text{SO}_3 \cdot 7 \text{H}_2\text{O}$
 - in this formulation, good corrosion inhibitor ~~[[of]]~~ for magnesium, aluminum and its alloys in alkali environment and in ~~water~~ aqueous solution of glycerol.
- 10. Potassium[[-sulfide]] sulfate

Kindly amend paragraphs 0100-0101, which appear at page 10 of the 4/24 specification:

- ~~quality~~ purity of at least 99%
- ~~solution-~~ easily soluble in water

Kindly amend paragraphs 0103-0114, which appear at pp. 10-11 of the 4/24 specification:

- 11. Sodium [[-]] meta-silicate
 - ~~inhibitor~~ inhibits corrosion of aluminum in ~~water~~ aqueous solution of this formulation.
- 12. Potassium[[[-]]] dichromate
 - ~~this additives~~ is used for metal protection in contact with antifreeze.
- 13. Sodium [[-]] chromate
 - chemical formula in acids ~~HNO_3 , H_3PO_4 i H_2SO_4~~ $(\text{Na}_2\text{CrO}_4)$
 - inhibitor of corrosion of steel, cast iron, aluminum, copper, ~~zink,~~ zinc and brass in ~~water~~ aqueous solution of this formulation.
- 14. Sodium [[-]] benzoate
 - chemical formula ~~$\text{C}_6\text{H}_5\text{SO}_6\text{Na}$ or $(\text{C}_7\text{H}_5\text{O}_2\text{Na})$~~ $\text{C}_7\text{H}_5\text{O}_2\text{Na}$
 - inhibitor of corrosion of steel in ~~water~~ aqueous solutions and ~~well-maintained~~ maintains pH values and alkalis.

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15. ~~Benzolsulphamide~~ Benzosulfamide
- chemical formula ~~C₆H₅SO₂NH₂~~ C₆H₅SO₂NH₂

Kindly amend paragraph 0121, which appears at page 11 of the 4/24 specification:

18. ~~Polymark polycarboxilate BASF, Polycarboxylates which are soluble in watery and alcohol solutions. In this invention is eked such as SOKALON® SOKALAN® CP-12S or CP-10 (BASF). In this formulation, well applicable is ABC COBLEX's polycarboxilate, too polycarboxylates also are useful.~~

Kindly amend paragraphs 0123-0124, which appear at page 11 of the 4/24 specification:

~~Therefore, for purpose of to maintain~~ pH values ~~maintenance~~ between 9.5-11 9.5 and 11, silicates are used which are especially important for aluminum engines for protection of aluminum components in the cooling system[[,]] and also for ~~maintenance of alkaline stocks in patent~~ maintaining alkalinity of the fluid. The most important component for pH value maintenance is sodium hydroxide, which can be used at with 0.5- 0.5 to 10% by weight in solution.

~~Following table "B" Table B~~ shows different variants of anti-corrosive non-toxic inhibitor compositions and regenerator-modifier compositions for wasted antifreeze.

Kindly amend paragraphs 0126-0128, which appear at pp. 12-13 of the 4/24 specification:

~~There should be noted that for~~ For corrosion inhibition of all engine types, besides said inhibitors, monocarboxylic acids, and ~~polycarboxylates~~ polycarboxylates in relatively small concentrations are suitable. ~~Then Also~~ Also, azole compounds, including mercaptobenzotriazole, benzotriazole salts, and polytriazole salts are can be included. ~~The preferred~~ Preferred are nitrate salts, nitrite salts, and mixture thereof. ~~Then Also~~ Also, phosphates may be used which are useful for corrosion inhibition, as is polycarboxylate.

Improved stable polycarboxylate type is based on ~~polyerylie~~ polyacrylic acid or polymaleic acid. These polycarboxylates are compatible with other components [[as]] in process for obtaining as and in subsequent fluid utilization. Examples for polycarboxylates which can be used are those which are produced ~~in German firm by BASF under the trade name SOKALON SOKALAN. These are polycarboxylates which are available in as water solutions. This inhibitor generally may be used in formulation from 0.01%-10%, but it is preferred from 0.01% to about 0.1% (by weight). This additive may be purchased under the trade name SOKALON® CP-12S or CP-10. This inhibitor generally may be used in formulation from 0.01 to 10%, but it is preferred from 0.01 to about 0.1% (by weight).~~

Process for obtaining is conducted in the reactor (container) by heating and cooling ~~and keeping to maintain a~~ constant temperature between 80-90°C. Mixing process after the heating takes about 1 h. ~~In this This process uses~~ 20-40% distilled

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(softened) water, 20-30% propylene glycol, 10-20% polyvalent alcohol (glycerol) ~~measured~~ and other inhibitor components. After that[[,]] follows cooling and packing according to market needs.

Kindly amend paragraphs 0142-0143, which appear at pp. 15-16 of the 4/24 specification:

Exploitation method: Corsica 3100 cc, passed ~~7.000~~ 7.000 km; table 5, Beretta 2300 cc, passed ~~5.000~~ 5.000 km; table 6, Pontiac 2300 cc, passed ~~10.000~~ 10.000 km and table 7, Pontiac 3100 cc, passed ~~20.000~~ 20.000 km. In all the vehicles coupons ~~have been~~ were installed for 8 months. Coupons were installed in the cooling system at the highest gravitation pressure. For example, water pump operating pressure was at an average about 1 kPa. Average engine operating temperature was about +110°C. After coupons were removed, coupons were processed according to ASTM standard.

Findings indicate that this antifreeze is in accordance with high ASTM standard and ~~it is~~ satisfactory ~~guarantee~~ for all the engines in which it is used in their cooling systems, and not only in warranty period, but above ~~300.000~~ 300.000 km and after 6 years of engine exploitation.